UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/586,387 | 10/02/2006 | Gunther Leising | 00366.000213. | 1804 |

5514 7590 01/05/2010

FITZPATRICK CELLA HARPER & SCINTO
1290 Avenue of the Americas
NEW YORK, NY 10104-3800

| EXAMINER | |
|---|---|
| HUBER, ROBERT T | |
| ART UNIT | PAPER NUMBER |
| 2892 | |
| MAIL DATE | DELIVERY MODE |
| 01/05/2010 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/586,387 | LEISING, GUNTHER | |
| | Examiner | Art Unit | |
| | ROBERT HUBER | 2892 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *20 October 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/20/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 20, 2009 has been entered.

### *Claim Objections*

2. Claims 1 – 6 are objected to because of the following informalities: Claim 1 recites in lines 10 – 11 "*coating the at least one uncoated LED or the UV LED of a plurality of LEDs*", which has improper antecedent basis issues and typographical errors. In particular, there is insufficient antecedent basis for the "*uncoated LED*", and "*the UV LED*" should read "*UV LED*". Furthermore, "*a plurality of LEDs*" was already recited in line 4. A best-deemed interpretation is made, and "*coating the at least one uncoated LED or the UV LED of a plurality of LEDs*" is interpreted to read "*coating the at least one uncoated blue LED or UV LED of the plurality of LEDs*". Claims 2 – 6 depend from claim 1. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mueller et al. (US 6,417,019 B1, prior art of record).

a. Regarding claim 1, **Mueller discloses a method for the producing a white LED of predetermined color temperature** (e.g. figure 6), **comprising**:

**determining a wavelength of at least one of an uncoated blue LED or an uncoated UV LED of a plurality of LEDs** (e.g. col. 3, lines 65 – 66 disclose the AlInGaN LED to emit light with a peak wavelength of 450 nm, which is blue light. Col. 4, line 65 discloses the LED 8 to be a AlInGaN LED)**;**

**determining once a quantity and a concentration of a conversion layer to be applied over the at least one uncoated blue LED or uncoated UV LED of the plurality of LEDs based on at least the wavelength determined** (e.g. as disclosed in col. 2, lines 32 - 35, col. 5, lines 58 - 62, and col. 6, lines 19 - 26), **wherein the conversion layer includes a color conversion agent** (e.g. agent disclosed in col. 3, lines 31 – 37)**, said conversion layer configured to absorb at least one of blue light and UV light, and emit light of longer wavelength** (conversion layer 42 made of phosphor particles. Col. 3, lines 35- 38

and col. 8, lines 10 – 14 disclose the emission of longer wavelengths from the phosphor particles that are excited from the blue or UV light of the LED)**; and**

**coating the at least one uncoated blue LED or UV LED of the plurality of LEDs** (LED 8, disclosed in col. 5, lines 30 – 31 to emit blue or UV light. Col. 8, lines 1 – 2 refer to "*phosphor coated LEDs*", indicating a plurality of LEDs. Furthermore, col. 8, lines 21 – 23 discloses forming individual LEDs from an LED wafer, which is coated with a phosphor film prior to LED separation), **with the conversion layer having the quantity and the concentration determined** (e.g. as determined in col. 5, lines 58 - 62, and col. 6, lines 19 – 26)**, wherein the coated LED has the predetermined color temperature** (it has been held that when the prior art discloses the structure of the claimed invention, a prima facie case of anticipation or obviousness of the properties of the device, such as the predetermined color temperature, has been established. See MPEP 2112.01).

b. Regarding claim 4, **Mueller discloses the method according to claim 1, as cited above, wherein the color conversion agent is applied by means of deposition in a gas phase** (col. 8, lines 36 - 40 disclose various gas-phase deposition methods), **wherein at least one of a quantity of said color conversion agent and a concentration of said color conversion agent is selected depending upon the exact wavelength** (e.g. col. 7, lines 26 - 30 and col. 9, lines 60 – 65 disclose adjusting the composition and concentration of the

phosphor particles in a conversion layer in response to desired chromaticity (wavelength) of the LED).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mueller et al. in view of Jones et al. (WO 00/12226, prior art of record).

a. Regarding claim 2, **Mueller discloses the method according to claim 1, as cited above, wherein at least one of a quantity of said color conversion agent and a concentration of said color conversion agent is selected depending upon the exact wavelength** (e.g. col. 7, lines 26 - 30 and col. 9, lines 60 – 65 disclose adjusting the composition and concentration of the phosphor particles in a conversion layer in response to desired chromaticity (wavelength) of the LED). **Mueller is silent with respect to the color conversion agent being applied by means of at least on of a dispenser and a stamp.**

**Jones discloses a method of forming a white LED** (e.g. figure 1) **in which a blue or a UV LED** (LED formed by electrode 12, layer 13 and electrode

14) **is coated with a conversion layer** (layer 16), **wherein the color conversion agent is applied by means of at least one of a dispenser and a stamp** (dispenser 1, disclosed on page 5, line 31).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Mueller to include the formation of the light conversion layer by means of a dispenser, as taught by Jones, since Jones discloses a method of forming a very similar structure to that of Mueller, but incorporates a formation of the conversion layer by means of a dispenser. One would have been motivated to use a dispenser since it is an effective way of forming a conversion layer on an LED, while reducing the harmful effects to the LED from lithography, as disclosed by Jones (page, 3, lines 17 - 26).

b. Regarding claim 3, **Mueller discloses the method according to claim 1, as cited above, wherein at least one of a quantity of said color conversion agent and a concentration of said color conversion agent is selected depending upon the exact wavelength** (e.g. col. 7, lines 26 - 30 and col. 9, lines 60 – 65 disclose adjusting the composition and concentration of the phosphor particles in a conversion layer in response to desired chromaticity (wavelength) of the LED). **Mueller is silent with respect to the color conversion agent being applied by means of inkjet printing.**

**Jones discloses a method of forming a white LED** (e.g. figure 1) **in which a blue or a UV LED** (LED formed by electrode 12, layer 13 and electrode

14**) is coated with a conversion layer** (layer 16), **wherein the color conversion agent is applied by means of inkjet printing** (page 5, line 28 - 31).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Mueller to include the formation of the light conversion layer by means of a inkjet printing, as taught by Jones, since Jones discloses a method of forming a very similar structure to that of Muller, but incorporates a formation of the conversion layer by means of a inkjet printing. One would have been motivated to use inkjet printing since it is an effective way of forming a conversion layer on an LED, while reducing the harmful effects to the LED from lithography, as disclosed by Jones (page, 3, lines 17 - 26).

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mueller et al. in view of Collins, III et al. (US 2003/0181122 A1, prior art of record). **Mueller discloses the method of claim 4, as cited above, wherein said deposition of color conversion agent in gas phase** (col. 8, lines 36 - 40 disclose various gas-phase deposition methods). **Mueller is silent with respect to a mask, such as a photomask, is produced, apertures of said mask being selected depending upon the exact wavelength.**

**Collins, III discloses a method of forming a white LED** (e.g. figures 1A – 1F) **in which a blue or a UV LED** (LED 18, disclosed in ¶ [0005] may emit blue light) **is coated with a conversion layer** (layer 22, disclosed in ¶ [0021]), **wherein a mask, in**

**particular a photomask, is produced** (mask formed by photoresist layer 20, disclosed in ¶ [0020] and [0021]), **apertures of said mask being selected in dependence upon the determined wavelength** (e.g. as disclosed in ¶ [0016] and [0023], the aperture 20c is controlled by the light exposure).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Mueller to include a mask, in particular a photomask, is produced, as taught by Collins, III, since Collins, III discloses a method of forming a very similar structure to that of Muller, but incorporates a formation a photomask in order to form the light conversion layer on the LED. One would have been motivated to form a photomask since can be used to form a controlled, patterned layer with various gas-deposition techniques (¶ [0004] of Collins, III).

The incorporation of the photomask of Collins, III with the method of deposition of the color conversion agent in the gas phase of Mueller renders obvious the limitation that the deposition of the color conversion agent in the gas phase is effected through the mask.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mueller et al. in view of Wojnarowski et al. (US 6,483,196 B1, prior art of record). **Mueller discloses the method according to claim 1, as cited above, but is silent with respect to the color conversion agent being initially homogeneously applied and subsequently selectively removed by means of a laser in correlation with the exact wavelength.**

**Wojnarowski discloses a method of forming a white LED** (e.g. figure 13, disclosed in col. 6, lines 44 - 50) **in which a blue or a UV LED** (LED 10) **is coated with a conversion layer** (layer 62 (not shown), disclosed in col. 6, lines 51 - 60), **wherein the color conversion agent is initially homogeneously applied** (e.g. as disclosed in col. 7, lines 1 – 8) **and subsequently removed by means of a laser in correlation with the exact wavelength** (e.g. as disclosed in col. 6, lines 55 – 60).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Mueller to include the formation of the color conversion layer by applying it homogenously and subsequently using a laser to selectively remove it, as taught by Wojnarowski, since Wojnarowski discloses a method of forming a very similar structure to that of Mueller, but incorporates a formation of the conversion layer by homogeneous formation and subsequent laser removal. One would have been motivated to apply the method of Wojnarowski since one can control the variations of the light output of the device by selectively removing portions of the conversion layer that adversely affect the device, as discussed in Wojnarowski (col. 6, lines 55 – 60).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu (US 5,886,401, prior art of record) in view of Mueller et al. **Liu discloses a white LED light source** (col. 3, line 40), **comprising a plurality of LEDs** (e.g. figure 2, and col. 2, line 34 discloses a plurality of LEDs), **wherein above each of said LEDs a conversion layer having a thickness is disposed** (e.g. phosphor layer 125, disclosed in col. 3,

line 39), **wherein the thickness of the conversion layer is proportional to a determined wavelength of light** (col. 3, lines 39 - 44 disclose the thickness of the conversion layer (phosphors) will depend on the color (wavelength) of the LED).

**Liu is silent with respect to disclosing the LEDs comprise blue or UV LEDs. However, Liu discloses in the Background of the Invention that blue-green LEDs are known in the art** (col. 1, line 14).

**Mueller discloses that blue or UV LEDs may be coated with a conversion layer to produce various light colors** (e.g. col. 8, lines 10 – 14)

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the device of Liu such that the LEDs of the device comprise blue or UV LEDs, since it was known in the art that blue LEDs may be used, as disclosed in the background of Liu, as well as disclosed by Mueller that either blue or UV emitting LEDs may be coated with a conversion layer to emit a variety of light colors. One would have been motivated to use blue or UV LEDs since blue or UV light has a higher energy wavelength and may be used to excite certain phosphors to emit longer wavelength of light (as disclosed by Mueller, col. 3, lines 35 - 37). Such a light emitting device would be advantageous in an array of LEDs used to as a white light source, since white light is comprised of at least the three primary colors (e.g. red, green, and blue).

***Response to Arguments***

10. Applicant's arguments filed on October 20, 2009 have been fully considered but they are not persuasive. At present, the prior art of Mueller et al. remains commensurate to the scope of the claims as stated by the Applicant within the context of the claim language and as broadly interpreted by the Examiner [MPEP 2111], which is elucidated and expounded upon above.

a. In response to Applicants arguments drawn to the amendment "*determining once a quantity and concentration of a conversion layer to be applied over the at least one uncoated blue LED or uncoated UV LED*" of claim 1, the Examiner finds that the prior art of Mueller anticipates the claimed limitation. The Applicant argues that Mueller discloses varying the composition of a conversion layer (phosphor particle layer) iteratively until the desired chromaticity is achieved, and hence, does not discloses the limitation of " *determining once a quantity and concentration of a conversion layer to be applied over the at least one uncoated blue LED or uncoated UV LED"* (Applicants Remarks, pages 6 – 9). The Examiner respectfully disagrees with the Applicant that Mueller fails to disclose this limitation. In particular, even assuming the Applicant's arguments are valid that the chromaticity of the conversion layer is determined iteratively (such as disclosed in col. 7, lines 3 - 5 of Mueller), this does not exclude that the quantity and concentration of the conversion layer is determined prior to the coating of the LED. Rather, Mueller discloses that the composition of the layer is chosen, and then fine-tuned (col. 6, line 64 – col. 7, line 3). Mueller also

disclosed that the LED wafer may be singled into separate LEDs, and then the conversion layer (phosphor film) is deposited on the LEDs (col. 9, lines 41 - 49). Since Mueller discloses the determination of the conversion layer (phosphor film) (e.g. col. 5, lines 58 - 62, col. 6, lines 45 - 55), and the formation of the conversion layer is by reactive sputtering and other deposition techniques (col. 8, lines 32 - 54), which creates the film with the desired composition during the formation of the film on the LEDs, it is anticipated or obvious that Mueller discloses determining the quantity and concentration of a conversion layer to be applied over the uncoated LEDs.

With respect to "*determining once a quantity and concentration of a conversion layer…*", since Mueller discloses the quantity and concentration to be determined, as just discussed above, then Mueller necessarily discloses that the quantity and concentration of the conversion layer is determined at least once. Furthermore, the preamble recites the term "*comprising*" which does not exclude additional steps. Hence, although Mueller discloses that the steps of determining the quantity and concentration of the conversion layer may be done iteratively, which implies further determination of the quantity and concentration of the conversion layer, the initial determination may be considered to be the first "*once*" determination of the quantity and concentration.

b. With respect to claim 7, the Applicant argues that the combination of the teachings of Mueller et al. with the device of Liu et al. would render the device of

Liu inoperable and unsatisfactory for its intended use. The Examiner respectfully disagrees. As cited above with respect to claim 7, the device of Liu teaches much of the claimed invention, including a plurality of LEDs and a conversion layer disposed on the LEDs, wherein the thickness of the conversion layer is proportional to the wavelength of the light of the LEDs. Liu is simply silent with respect to explicitly disclosing the LEDs emit blue of UV light. Mueller is used to teach that LEDs may emit blue or UV light, and that one of ordinary skill in the art would be able to incorporate blue or UV LEDs into the device of Liu for at least the purpose of creating a white-light emitting device.

The Applicant argues that such a combination would render the invention of Liu inoperable or unsatisfactory for its intended purpose by proposing that the Mueller LEDs in the device of Liu would not yield a conversion layer thickness proportional to the wavelength (Applicants Remarks, page 9). However, the Examiner submits that the prior art of Mueller is used to teach LEDs may emit blue or UV light, and NOT the structure of the LEDs or the conversion layer. Therefore, it is not the structure of the device of Mueller that is incorporated into the device of Liu, but rather the teaching that the LEDs may emit blue or UV light. Liu discloses that the structured is used for an LED device with enhanced optical output coupling efficiency, improved thermal management, and improved packaging density (col. 1, lines 49 - 63). There is no where that suggests or implies that the use of blue or UV LEDs in Liu would render the device inoperable or unsatisfactory for its intended purpose, and it appears that the use of any light

emitting LED would be useful in the device of Liu. Hence, it is not found persuasive that a blue or UV LED would render the device of Liu inoperable or unsatisfactory for its intended purpose.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT HUBER whose telephone number is (571)270-3899. The examiner can normally be reached on Monday - Thursday (9am - 6pm EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao Le can be reached on (571) 272-1708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert Huber/
Examiner, Art Unit 2892
December 28, 2009

/Lex Malsawma/
Primary Examiner, Art Unit 2892